

HLW & FD EIS PROJECT - (AR)PF
Control # DC-01

Rev1 EISreview

Comments on "Draft INEEL HLW EIS, Idaho High-Level Waste & Facilities Disposition"

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Thanks for asking for my opinions of your "Draft INEEL HLW EIS". It's nice to see that the effort I've put into my hobby (HLW management) during the past few years qualifies me to be one of the Site's "key stakeholders". Since the National Academy of Science's Board on Radioactive Waste Management seems to feel the same way (they've sent me a personal copy of their review of the Site's HLW program), I've decided to put my thoughts about both of these reports together into one note.

Here it is:

First of all, I feel that these documents have dealt INEEL's credibility as the "lead laboratory" another big blow. I also feel that its future viability as an applied engineering facility has been seriously threatened.

Since the NAS's report is more prestigious and apt to have greater impact on INEEL, I'll start off with it.

1-2
X(3)

I sympathize with the Panel's frustration with the management "symptoms" that make doing nothing seem more sensible than trying to implement any of the EIS alternatives consistent with today's HLW management paradigm. (These symptoms are identified in another recent NAS Report, "Barriers to Science", 1996.) However, while I agree with the Panel's reservations about the "separations" approach championed by INEEL's decision-makers, I don't agree with its conclusion that it would be best to abrogate the two key HLW-related provisions of the "Batt agreement", i.e., to not render existing calcines "road ready" by 2035 AD and to not calcine the remaining liquid waste by 2012 AD.

Since DOE could honor its promises if it were simply willing to eschew some of its "symptoms", a more constructive conclusion would have been to suggest that it do so and identify specific changes that need to be made.

I also disagree with two of the Panel's rationalizations for its conclusions: 1) it is not necessary to delay decision-making until we know more than we do already about the chemical composition of INTEC wastes: we know everything that's genuinely relevant to implementing any of several reasonable rock-making processes and "characterization" via the science of analytical chemistry cannot prove that there isn't a molecule of "listed" waste somewhere in the tanks/binsets (only God can know such things) - "characterization" done for its own sake is simply another of DOE's fabulously expensive delaying tactics, and 2) it is not necessary to know every conceivable detail about the waste's ultimate resting place (repository) to get on with our job of converting it into road-ready waste forms - we can and should make materials suitable for disposal in any of several already sufficiently-characterized & technically competent potential candidate repository sites, the same assumption made by the people who designed the "historic waste" solidification system for BNFL's Sellafield facility (UK) and who decided to encapsulate everything with concrete.

¹ For example, a recent estimate of what the US taxpayer is now paying to "characterize" each of the barrels of RWMC waste being prepared for shipment from INEEL to WIPP is \$60,000 (roughly the cost of a four-year degree at a good college). The nominal purpose of this activity is to "assign codes" to the waste - the numbers do not influence how the barrel is shipped or what will be done with it at the repository.

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1-40
iii. D-1 (4)
1-41
X(3)
[What we genuinely don't know enough about yet are specific details of how to go about applying alternative treatment/solidification technologies to INEEL's wastes.] The reason for this is that DOE-ID's M&O contractor refused to spend any of its "programmatic" money on actual R&D - virtually all the money spent on alternatives to its pet separation/vitrification scheme went to produce "group think" exercises similar to the Draft HLW EIS.]

1-3
V(6)
[There is an important factual error in the NAS report (it isn't the Panel's fault - it was pulled verbatim out of an INEEL technical publication.) Figure 11.1 (p 99) suggests that ICPP/INTEC calcines are about ten times more radioactive than they really are (i.e., that they possess a total radioactivity of about 60,000 curies/m³). In this case, the number is important because it suggests that it would take more than one hundred years for those calcines to decay down to a level now considered to be "low". The fact is that typical ICPP/INTEC calcines generate only about 40 watts worth of radioactive heat/m³ (due primarily to ⁹⁰Sr & ¹³⁷Cs) which corresponds to a radioactivity of ~7,000 Ci/m³ - which, in turn, means that they're about at "Class C" LLW limits now & definitely will be below them (fission-product-wise at least,) by the time that we've promised to have 'em ready to be shipped offsite.]

1-4
V(a)
[Of course, in a rational world it really wouldn't make much difference exactly how "hot" these wastes are because any facility used to treat/dispose of them would certainly be "remoted" anyway - where it makes a difference is when decision-makers decide what they are going to do based solely upon arbitrary (and therefore subject to change) criteria such as the radwaste classification numbers listed in Table II of 10 CFR 61. The US Nuclear Establishment's infatuation with legalistic hair-splitting rather than common-sense implementation of the intent of laws/regulations (another of its "symptoms") is evidenced by INEEL's insistence that SBW is fundamentally different than the reprocessing waste that's already been calcined. If/when we ever screw up enough courage/resolve to calcine SBW, we'll discover that the resulting product is just as nasty as the other calcines (it'll have a higher percentage of plutonium, less of fission products, more mercury, less cadmium, etc., etc.). There is no good reason to treat them differently just because somebody decided to label one of them "high" and the other "incidental". Logically, they should be turned into one type of waste form and disposed of in one type of repository.]

The NAS apparently wasn't told that there's enough room in the binsets (set #7) to accept any calcine made from SBW without having to mix it with existing calcines and thereby render it "high". That's important because one of its rationalizations for recommending that DOE-ID break its promise to calcine SBW (which wouldn't be good for the Site's credibility) is that so-causing it to become "high" would make it more difficult to deal with. It wouldn't, making any kind of durable "rock" out of SBW (concrete, HIPed glass-ceramic, or glass) would be facilitated by first burning out the volatile stuff.]

1-5
iii. C(2)
[As far as how to go about calcining this waste is concerned, the reason we haven't been able to succeed at it is that the Site's decision-makers deliberately decided to not use the only really efficient approach available to do it; i.e., add some sugar just before squirting the stuff into the calciner. It's an well-established and safe way to calcine SBW (the rest of the world (e.g. BNFL at Sellafield) routinely does it that way & we successfully tested the concept here at NRTS/INEL/INEEL thirty-five years ago and again ~ 3-4 years ago). If you refuse to calcine that way (today's excuse is "safety") then you either have to dilute SBW with massive amounts of easily-denitrated stuff such as aluminum nitrate - which makes calcination extremely slow, unnecessarily "NOx-ous", and creates a lot more calcine than actually we need to - or run the calciner at a temperature that generates so much "fines" that the offgas system becomes plugged up with dust (the reason why the last "high temperature" calcination campaign had to be shut down).] The fact that the Site's decision-makers have also steadfastly refused to do things like recover/recycle Mercury (electroplate it from the calciner's offgas scrub solution) and NO_x from NWCF offgas has made calcination a lot less attractive (& that mission less viable) than it ought to be. Some sorts of modifications to NWCF would indeed cost a lot of money but these two would be pretty cheap.]

1-7
iii. C(2)
[There are two reasons why sugar calcination would greatly reduce the amount of NO_x that's emitted by NWCF. First, much less aluminum nitrate would have to be added to the waste (we'd need an Al:Na ratio of ~1:1 instead of the ~3:1 required by the "basis approach" - each mole of Al so-added adds another three moles of nitrate). Second, sugar calcination reduces most of the nitrate in the calciner's feed to

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elemental nitrogen instead of to NO_x . Since NO_x is the probably the most toxic gas emitted by NWCF (& certainly the most visible one), don't you think that an "EIS" ought to mention that there's a cheap fix available for it? [Cheap? @ 20 cents/pound, enough table-quality sugar to sugar-calcine all SBW would cost about \$0.5 million – "running" NWCF costs ~\$50 million/year & sugar-calcination of SBW would cut the required operational time by at least a factor of two.]

1-8
III.D.4(4) [Why doesn't this EIS mention that STUDSVIK offered to sell INEEL a brand new, MACT-compatible calcination system (including a new building to put it in) for considerably less than what it's now spending every year to "run" NWCF?

1-9
III.D.4(7) [Since the NAS Panel apparently agrees that homogenizing these wastes would be a good thing to do, why isn't the waste coprocessing option that I suggested six years ago (i.e., slurry SBW with existing calcines, add some sugar and then feed both phases into NWCF) and which was then subsequently deemed feasible by a Fluor Daniel report (1986) mentioned in the EIS? The University of North Dakota's fluidized bed combustion research facility ("EERC") offered to do a pilot plant scale demonstration of that process for ~\$20,000. This offer was ignored.]

1-10
VII.D(6) [DOE promised to calcine all of INEEL's reprocessing waste (BATT agreement) going that would make 1-42
1-43
III.C(1) conversion of that waste into good-quality waste forms much easier] and [it can be done both on time (by 2012 AD) for a reasonable number of dollars – why does this EIS devote so little attention to evaluating ways to actually accomplish it?] 1-44 III.C(2)

Incidentally, I've just heard through the company grapevine that most of BBW's radwaste experts have been cloistered up in town for the last 3-4 weeks trying to decide upon a way of dealing with SBW consistent with all of today's customs/policies/assumptions – apparently someone's pushing for a decision on a "preferred alternative".

1-11
III.F.3(1) [I've also heard that the SBW treatment alternative viewed with the most favor invokes running it through Columns/contactors to separate it into streams called "non-contact handled TRU" and "Class C" LLW, grouting both of 'em, and then shipping both off to be buried in differently-labeled holes at WIPP. Apparently, somebody's decided that there's only so much "room" for one of these waste categories at WIPP (I forget which one) so it would, therefore, make good sense for us to spend a few tens (hundreds?) of million taxdollars separating the stuff before we ship it all off to the same place.] (This kind of gov't spending/planning gives me a warm feeling when I send off my check to the IRS every year.)

1-12
III.D.4(7) [Again, according to the grapevine, none of the NAS report's suggested SBW treatment options are being considered. Why not?]

Here are some questions about how the processing alternatives are represented in the EIS Summary.

1-13
III.C(4) [First, most of your process options invoke the grouting of one or more waste liquid streams – most of which would be strongly acidic. None of the figures you've shown depict that those streams will be calcined/incinerated prior to being solidified. Why not? Doing so simultaneously reduces the mass/volume of grout you'll have to make, destroys troublesome stuff like "listed" organics, and makes a much more durable concrete product.]

1-14
III.D.2.4(1) [Second, your Hot Isostatic Pressed (HIP) Waste option (Fig. S-9) invokes the HIPping of ion exchange resin. You can't put gas-forming materials into HIP cans. The figure needs to indicate some sort of heat-pretreatment step.]

1-15
III.D.3(4) [Third, your "Planning Basis" (Fig. S-7) and "Minimum INEEL Processing alternatives (S-12) suggest that Cs-loaded ion exchange resin will be "separated" along with the calcines. Would a process designed to dissolve/extract calcines work with ion exchange resins? Wouldn't it be better to burn the resins and treat the ash? If that's to be done, your figures should depict the necessary incinerator. Ditto that for all of the "separation" alternatives.]

Next, let's discuss the management scenarios that I've had some hand in bringing to the Public's attention – all those that would convert stuff now considered to be "high" into concrete.

1-16
III.D.2.b(4) [First, I'm disappointed that the folks you've hired to produce this Draft EIS managed to conclude that the "direct cement" option – turning a pile of sand-like calcine into cans full of "rock" by mixing it with cementing agents & water, injecting that grout into steel canisters, and then curing them in a pressure cooker (which step might not even be necessary – only some hands-on research can really tell) – would be as "dangerous" as your last M&O Contractor's pet separations-based "Planning Approach" – which of course, invokes far more unit operations, more time, more people, (a lot) more toxic chemicals, much higher (>2000 F) processing temperatures, multiple waste forms, an extra incinerator, transport to multiple repositories, etc., etc.] However, in view of the degree of "command influence" that goes into the production of official DOE-EM technical reports (often reflected by deliberate omission of uncomfortable facts), I'm not really surprised at this conclusion.

1-17
III.D.2.b(1) [Here's why a properly implemented "direct cement" alternative would have low environmental impact. First of all, I've always advocated that "direct cement" be implemented in such a way that all of ICPP/INTEC's waste is converted to the same type of waste form and goes to the same repository. [That's not the way the EIS interprets it – it proposes making a large separate LLW waste stream that's very apt to end being left in Idaho – an unnecessary assumption that makes this option much less attractive to stakeholders.] A one-process/one-waste form/one-repository scenario would be much simpler than any of the other alternatives which would actually keep the promises that have been made to stakeholders. Simplicity means less equipment, fewer personnel, less chemicals, less paperwork, less confusion, fewer lawyers, etc., etc. – all characteristics that tend to make doing things less "impactful" to both the environment and the taxpayer's pocketbook.]

1-19
III.D.3(3) [Our mission is simply to make ICPP/INTEC reprocessing waste "road ready" for transport to an offsite repository that the Federal Government (DOE?) has promised to provide and then clean up the place, period. It's not to "make work" for thousands of DOE/Contractor/subcontractor personnel or to try to justify dumb decisions that have already been made elsewhere with respect to implementing/siting repositories, categorizing radwastes, and/or making them ready for transport.] My assumptions are that, 1) there's plenty of suitable "Federal Land" available (notably at the NTS) for a practical sort of repository for defense-type reprocessing waste, (meaning one that doesn't assign today's phony premium to "volume reduction" – apparently our HLW experts are still being told that the incremental cost of 1 m³ worth of YM is ~ a half-million dollars) 2) the politicians who can decide to implement such a repository will eventually do so when convinced that it's simultaneously possible, politically defensible and affordable, 3) cement-solidified calcine would meet the "letter of the law" (10CFR-60 & 40CFR-191) as a HLW disposal form, and 4) that until a suitable repository actually materializes, we should simply emulate the UK's approach to "historic" reprocessing waste management.] 1-23 III.E(2)

1-21
III.D.2.b(4) [If reasonable attention is paid to minimizing the solids content of the liquids generated in cleaning up the place (termed NGLW in this EIS), the amount of radioactive "ash" that would be produced by drying/calcining those liquids will be small with respect to that represented by today's calcines and SBW. Consequently, I propose(d) that they be processed/disposed-of in exactly the same manner – no additional equipment, repositories, assumptions, or paperwork required.]

Its decision to confound disposal of its own waste with that produced by the commercial nuclear power industry constitutes another reason why the US Federal Government has failed to honor its promises to Idaho (the first official promise to prepare our waste for disposal said it'd be done by 1980). Due to DOD insistence that DOE's civilian waste management responsibilities not interfere with its own interests at NTS, the Federal government chose to "withdraw" another ~600 km² of land from Nevada for today's official HLW repository modeling exercise (YM). This plus the assumption that all commercially-produced HLW is to be sent there engenders enough litigation to indefinitely block implementation of that repository – which means that linking these problems causes total paralysis. The most reasonable place for the Federal Government to site a repository dedicated to cold-war defense-type waste is at its cold-war defense-type test range, the Nevada Test Site (NTS). The NTS makes good sense because, a) it's already "federal land" (no new "withdrawal" required) b) it receives less precipitation than do other DOE sites, c) it possesses the USA's deepest water table, d) it has already been the object of more than thirty years worth of immediately relevant hydrogeological research, e) it's already been irredeemably "crapped up" by ~950 nuclear "events", and, finally, f) a little-publicized real example of a practical (cheap) repository for this sort of waste has already been implemented and (then) exhaustively tested (the "GCID" in area 5). However, it is not necessary to wait for a repository siting decision to begin rendering INEEL waste road-ready (the UK didn't) – regardless of exactly where that waste might eventually end up, it is reasonable to assume that HC-type concrete would be at least as durable as glass due to the fact that its mineralogical similarity to natural soil minerals provides less thermodynamic driving force for alteration.